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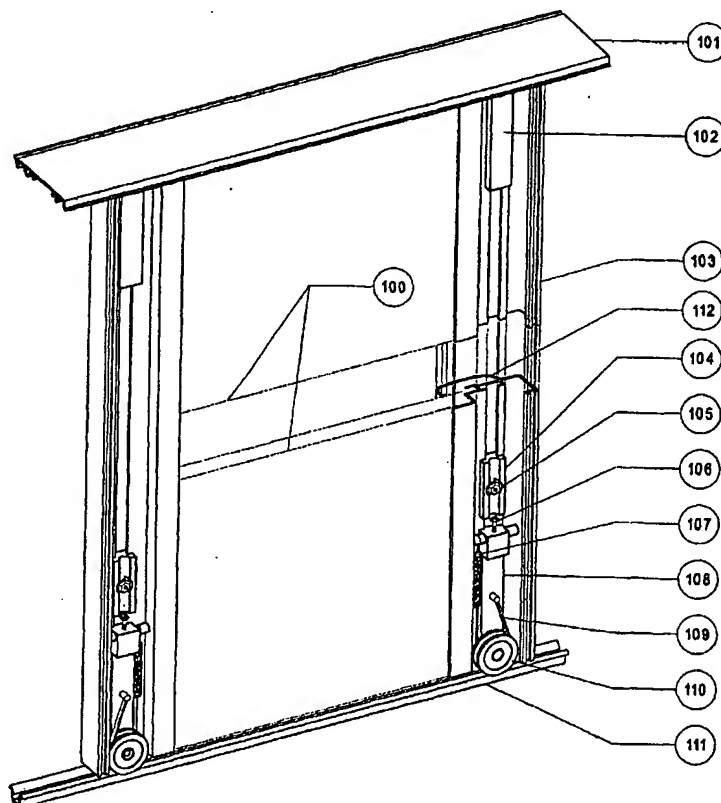
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(54) Title: PROFILE OF SLIDING DOOR ROLLER ASSEMBLING



(57) Abstract: The present invention provides a new sliding assembly for a sliding closure. The present invention is constructed of two metal profiles mounted on each side wall of sliding closure and guiding bars for sliding on said rail. The profiles design includes a rail which length, is adjusted to the sliding closure height. The lower sliding bar is attached to a roller, which slides along the lower track of the closure. The second sliding bar is attached to the guiding bar for sliding along the upper track of the closure. An elastic stretching means connects between the lower sliding bar and the profile.

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Profile of Sliding Door Roller Assembling

BACKGROUND

The present invention relates to sliding doors that utilize roller assemblies to move back and forth within tracks. Such assemblies are well known in the prior art
5 and have undergone various modifications in order to allow the doors to roll progressively more freely and efficiently.

Some of the problems encountered in the past with sliding door mechanisms include imperfections or other obstacles in the tracks, which cause the rolling doors to get stuck, become difficult to move or to be derailed from the track. A well-known
10 solution to this problem is to construct spring based roller mechanisms, which allow the wheels to skip over obstacles or slight variations and guide the door freely through the track.

Another factor that affects the level of functionality of sliding door roller assemblies is the level of adjustability and ease of assembly. US patent no. 5845363
15 describes a mechanism that is easy and inexpensive to construct, and includes an adjustment gear that is readily accessible to the user. US patent no. 4,253,278 describes a similar device. The height of the mechanism can be adjusted according to the track after it has been installed.

Another roller assembly is described in US patent no. 3,959,849, which
20 discloses an assembly that can be installed without the help of special tools or a skilled worker. This assembly features tabs that are fixed on the sides of the roller housing in order to stabilize door movement.

The disadvantage of the assemblies as described above is that the installation of the rollers is complex and requires adjustment of the roller assembly to each sliding
25 door type.. The present invention offers a simple and affordable solution to this

problem by incorporating an extra adjustable feature in order to enable the simple assembly of the roller device to any type of sliding door. This contributes to the ease of building constructions using sliding door mechanisms or replacing old parts when needed.

5 Further more, prior art sliding structures which are constructed as exterior part of the sliding door are fragile and may be unstable.

It is thus the prime object of the invention to avoid the limitations of the prior art and to provide a simple and stable sliding mechanism.

SUMMARY

10

The present invention provides a new sliding assembly for a sliding door closure comprised of: two metal profiles mounted on each side wall of sliding closure, said profiles design includes a rail wherein the rail length is adjusted to the sliding closure height, a guiding roller for rolling along the lower closure track, a guiding bar
15 for sliding along the upper track wherein the guiding bar is attached to the track by pressure means, a first sliding bar attached to the roller for sliding along lower part of rail, a second sliding bar attached to the guiding bar for sliding along the upper part of rail; elastic stretching means for connecting between at least one sliding bar and the profile, and adjustable fastening means installed on the profile in a position which
20 maintains said elastic means under compression so as to limit the optimum outward position of at least one sliding bar.

BRIEF DESCRIPTION OF THE DRAWINGS

These and further features and advantages of the invention will become more
25 clearly understood in light of the ensuing description of a preferred embodiment

thereof, given by way of example only, with reference to the accompanying drawings, wherein-

- FIG. 1 is a perspective view of the present invention;
- 5 FIG. 2 is an enlarged frontal view of the present invention;
- FIG. 3 is a detailed cross section of the present invention;
- FIG. 4a is an enlarged front view of the lower sliding bar as implemented within the metal profile;
- FIG. 4b is an enlarged perspective view of the lower sliding bar components;
- 10 FIG. 4c is an enlarged perspective view of the upper sliding bar;
- FIG. 4d is an enlarged perspective view of the barrier not including the fastening bolt;
- FIG. 5 is an enlarged top view of the metal profile;
- FIG. 6a is a diagram showing the process of connecting the upper sliding bar to the upper track;
- 15 FIG. 6b and 6c are diagrams illustrating the process of removing the upper sliding bar from the upper track;
- FIG. 7a is an enlarged front view of the upper sliding bar;
- FIG. 7b is an enlarged side view of the upper sliding bar;
- FIG. 7c is an enlarged top view of the upper sliding bar;
- 20 FIG. 8a is an enlarged front view of the lower sliding bar;
- FIG. 8b is an enlarged top view of the lower sliding bar;
- FIG. 8c is an enlarged side view of the lower sliding bar;
- FIG. 9a is an enlarged front view of the barrier;
- FIG. 9b is an enlarged top view of the barrier;
- 25 FIG. 9c is an enlarged top cross-section of the barrier;

FIG. 9d is an enlarged side view of the barrier;

FIG. 10 is an alternative structure of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

5 The present invention provides a novel roller assembly for the track of a sliding door. The assembly has a unique structure that enables simple adjustment of its components to correspond to variable sizes of sliding doors and respective built-in tracks of closets, cupboards, or any other structure incorporating a sliding door.

10 The roller assembly's main components can be seen in figure 1 and are described below.

 The assembly includes two identical metal profiles (103), a unique component of the present invention, designed to be mounted on each side of the sliding door (100).

15 Prior art sliding mechanism are exterior parts which are mounted at the bottom of the sliding door, according to the present invention the sliding mechanism is mounted in the profiles, thus providing stable sliding structure.

20 These profiles allow for easy installation of the apparatus and further stabilize and strengthen the door to which they are mounted. Part of each metal profile forms a rail (112) along the side. Two sliding bars (102 and 108) are designed to slide along the rail (112). The lower sliding bar (108) is positioned on the lower part of the sliding door side and is attached to the roller (110), which guides the door through the lower track (111). The upper sliding bar (102) is positioned on the top part of the door's side and is designed to guide the metal profile and attached door along the specific upper track (101) described in the present invention.

25 Upon assembly, the upper sliding bar is easily clicked into place along the track

using pressure. However, to prevent unwanted derailing, the sliding bar is designed to be removed only when turned 45 degrees away from the track, which is impossible while it is connected to the door. The processes of installing and removing the sliding bar are shown in figures 6a and 6b respectively. This bar also contains a small pin that
5 holds it in place along the metal profile before assembly.

The lower sliding bar involves several components that contribute to the adjustability of the present invention and to the ease of movement of the door. These components can be seen assembled and disassembled in figures 8a and 8b respectively. The roller (110), positioned at the bottom of the sliding bar (108), guides
10 the bar through the lower track (111). This roller is attached to the respective pin (805) on the bar using pressure during assembly process of the invention. There is a groove running throughout the center of the roller, which rolls along the one side of the lower track to prevent derailing. Along the center of this groove runs a smaller, deeper groove for minimizing friction.

15 Optionally, on the sliding bar above the roller is mounted a pin holding a strip of plastic (801)(se Fig. 4a and 4b). This pin is attached to the sliding bar by inserting it into the corresponding positioned hole (802) in the bar. The strip is designed to fit within the outer groove of the roller and wipe away dust and other small obstacles during the movement of the door.

20 An adjustment mechanism (106) is positioned at the top of the lower sliding bar (108). This mechanism is designed for balancing the lower sliding bar height to fit the specific door track structure. It contains a bolt (803) at the top and a small rod (804) running through its center.

The lower sliding bar also contains a coil spring (107), which is attached from
25 one side by a hook to the rod (804) and connects on the other side to the bottom of the

metal profile (103), also using a hook on its other end. The spring provides flexibility for the sliding bar and allows the door to slide freely despite any obstructions within the lower track (111).

Above the lower sliding bar (108), a barrier (104) is positioned within the track
5 of the metal profile (103) and is fastened to it with a bolt (105) to constrain the movement of the sliding bar (108).

The metal profile of the assembly can be distributed as long rod. The carpenter who installs the roller assembly can cut the rod at any size, adjusting the metal profile rail length to the sliding door height. The fastening member can be positioned at any
10 point along the sliding door side and adjusted to the size of the specific track used in the structure. The invention can then be easily adjusted to the height of the sliding door by turning the bolt that controls the adjustment mechanism.

The present invention can be constructed according to a different design as illustrated in Fig. 10.

15 According to an alternative design the assembly includes two metal profiles (10.01) mounted on each side wall (10.00) of the sliding door. Part of this metal profile forms a rail along the side wall (10.02). Two sliding bars are designed to slide along the rail (10.02). The first bar (10.04) positioned on the lower part of the sliding door side wall and is attached to the roller (10.06), which guides the door through the
20 lower track (10.03). The second sliding bar (10.05) is positioned on the top part of the door wall and is attached to the guiding bar (10.07) above the door, which slides along the upper track (10.08).

Above the lower sliding bar (10.04) is an adjustment mechanism (10.09), controlled by the adjustment bolt (10.10), placed in a groove within the metal profile
25 (10.01). This mechanism is designed to enable the balance the two sliding bars (10.04

and 10.05).

Two coil springs (10.11 and 10.12) connect each of the sliding bars to the metal profile. This provides flexibility, which allows the door to slide freely despite any obstructions within the track (10.03). A fastening member (10.13) is positioned as
5 barrier constraining the movement of the sliding bars (10.04,10.05).

The metal profile (10.02) of the assembly can be distributed as long rod. The carpenter who installs the roller assembly can cut the rod at any size, adjusting the metal profile rail length to the sliding door height. The fastening member (10.13) can be positioned at any point along the sliding door side wall (10.00) and adjusted to the
10 size of the specific track (10.03) used in the structure. The invention can then be easily adjusted to the height of the sliding door by turning the bolt (10.10) that controls the adjustment mechanism (10.09).

While the above description contains many specificities, these should not be construed as limitations on the scope of the invention, but rather as exemplifications
15 of the preferred embodiments. Those skilled in the art will envision other possible variations that are within its scope. Accordingly, the scope of the invention should be determined not by the embodiment illustrated, but by the appended claims and their legal equivalents.

What is claimed is:

1. A sliding assembly for a sliding closure comprised of:
 - Two metal profile mounted on each side wall of sliding closure, said profiles design includes a rail wherein the rail length is adjusted to the sliding closure height;
 - A guiding roller for rolling along the lower closure track;
 - A guiding bar for sliding along a upper track wherein the guiding bar is attached to the track by pressure means;
 - A first sliding bar attached to the roller for sliding along lower part of rail;
 - A second sliding bar attached to the guiding bar for sliding along the upper part of rail;
 - Elastic stretching means for connecting between at least one sliding bars and the profile;
 - Adjustable fastening means installed on the profile in a positioned which maintains said elastic means under compression so as to limit the optimum outward position of at least one sliding bar.
2. The sliding assembly of claim 1 wherein the elastic means are connected to the first sliding bar using fastening means at one edge and to the profile by hooking means at the opposite edge.
3. The sliding assembly of claim 1 wherein the elastic means are connected to the first sliding bar and the profile using fastening means.

4. The sliding assembly of claim 1 wherein the elastic means are connected to the second sliding bar using fastening means at one edge and to the profile by hooking means at the opposite edge.
5. The sliding assembly of claim 1 wherein the elastic means are connected to the second sliding bar and the profile using fastening means.
6. The sliding assembly of claim 1 wherein the guiding bar upper edge is designed to fit the upper track enabling to attach the guiding bar to the track by applying pressure means at vertical position and disconnecting the guiding bar when turned by 45 degrees with respect to the track.
7. The sliding assembly of claim 1 wherein the guiding roller design includes a pin at the lower part, said pin designated for mounting the rolling disc upon.
8. The sliding assembly of claim 1 wherein the guiding roller further includes rubber strip positioned above the rolling disc, said strip designated for cleaning in rolling disc groove.
9. The sliding assembly of claim 1 wherein the guiding roller rolling disc includes a further inner groove.
10. The sliding assembly of claim 1 wherein the guiding bar includes small pins at the upper part of the bar side, said pins designated for keeping the bar at the upper part of the rail during the assembly process.
11. The sliding assembly of claim 1 wherein the guiding roller further includes adjustment means at the top;
12. A method for assembling sliding system for a sliding closure, said method comprises the steps of:

- Cutting two metal profiles wherein the profile length is adjusted to the sliding closure height and said profiles design includes a rail;
 - Mounting the two metal profiles at each the side wall of sliding closure;
 - Attaching adjustable fastening means to the profile in a position that limits the optimum outward position of at least one sliding bar;
 - Attaching a first sliding bar to the profile rail for sliding along the rail lower part, wherein said sliding bar is attached to a guiding roller unit;
 - Attaching a second sliding bar to the profile rail for sliding along the rail upper part, wherein said sliding bar is attached to the guiding bar;
13. The method of claim 12 wherein the first sliding bar is connected by elastic means, using fastening means at one edge of the elastic means for connecting the sliding bar and hooking means at the opposite edge for connecting the profile.
14. The method of claim 12 wherein the first sliding bar is connected by elastic means, said elastic means are connected to the first sliding bar and the profile using fastening means.
15. The method of claim 12 wherein the second sliding bar is connected by elastic means, said elastic means are hooked to the second sliding bar and to the profile.
16. The method of claim 12 wherein the second sliding bar is connected by elastic means, said elastic means are connected to the second sliding bar and the profile using fastening means.

17. The method of claim 12 wherein the guiding bar upper edge attached to the upper track by using pressure means.
18. The method of claim 12 wherein the guiding bar upper edge is disconnect when turned by 45 degrees with respect to the upper track.
19. The method of claim 12 further wherein the attachment of the guiding roller to the guiding bar is processed by the applying pressure on the guiding roller to fit in a pin which is positioned at the rail lower part.
20. The method of claim 12 further including the step of attaching a rubber strip to the first guiding bar positioned above the guiding roller, said strip designated for cleaning the rolling disc groove.
21. The method of claim 12 wherein the guiding roller includes a further inner groove.
22. The method of claim 12 wherein during the process of attaching the guiding bar to the rail the bar is hooked on the profile by using small pins at the upper part of the bar side.
23. The method of claim 12 further comprising the step of adjusting fastening means attached to the first guiding bar to fit the sliding closure height;

FIG 1

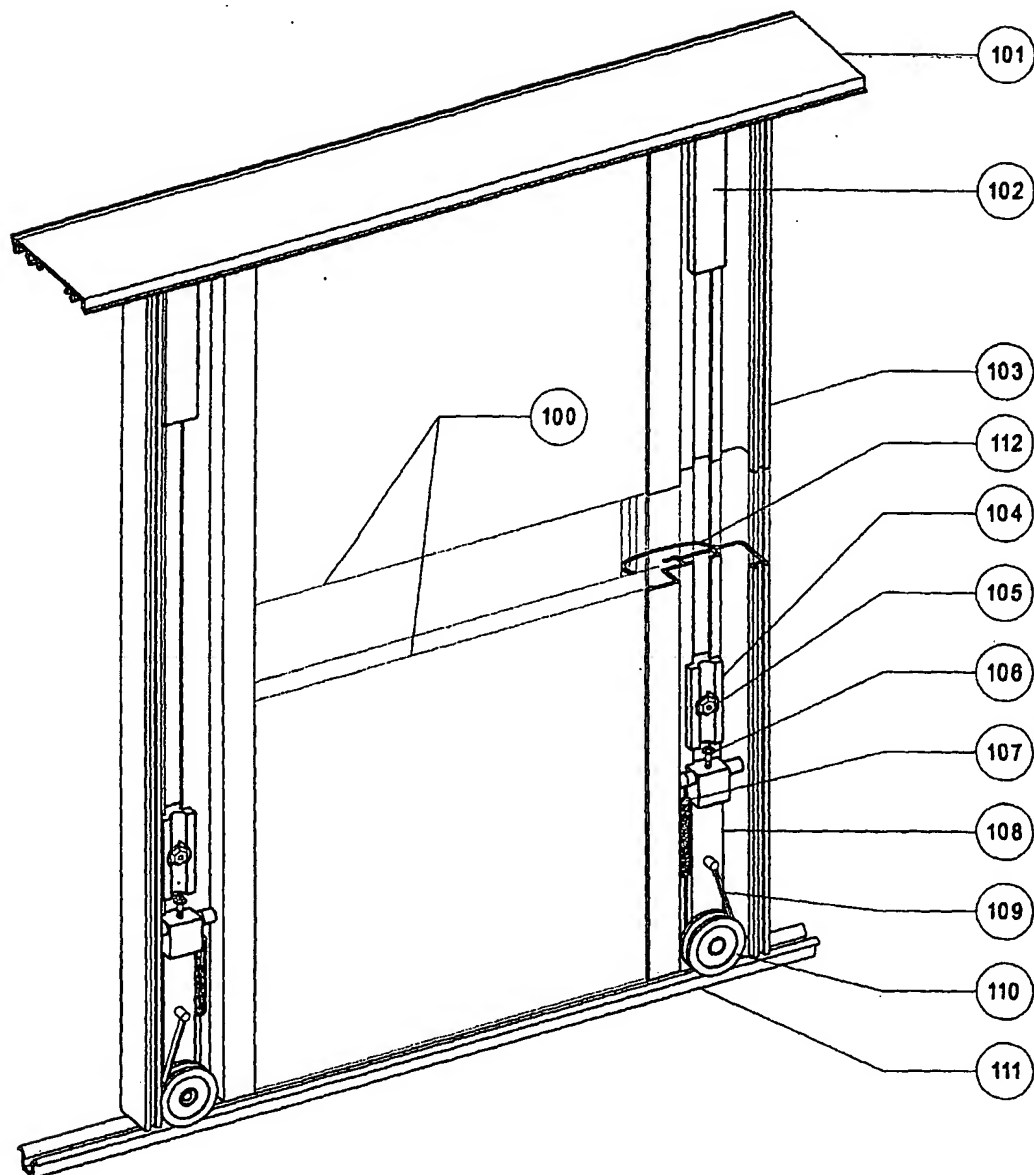


FIG 2

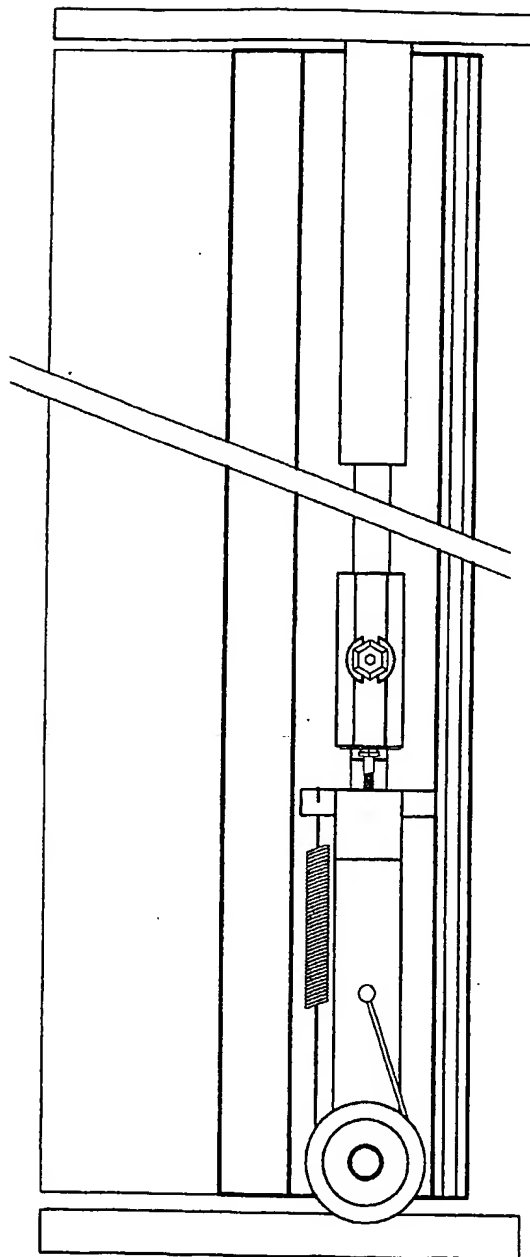
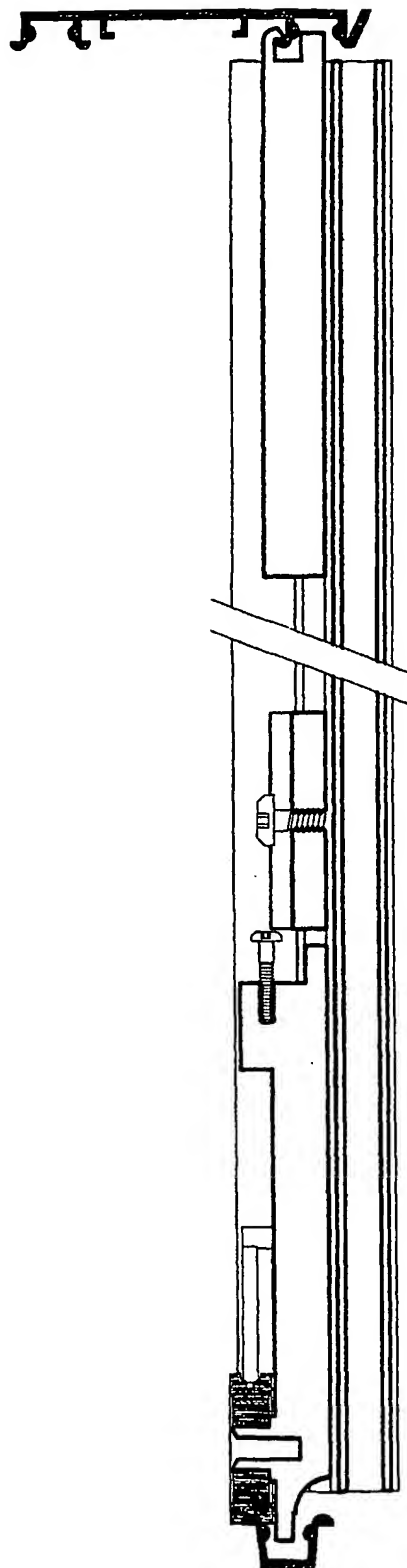


FIG 3



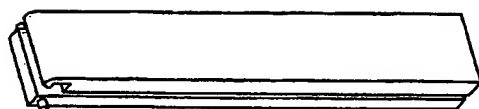


FIG 4c

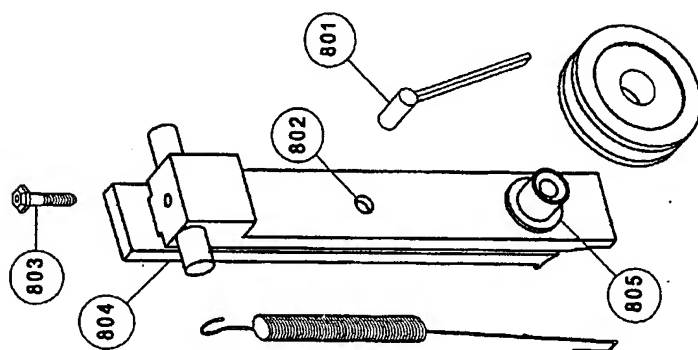


FIG 4b

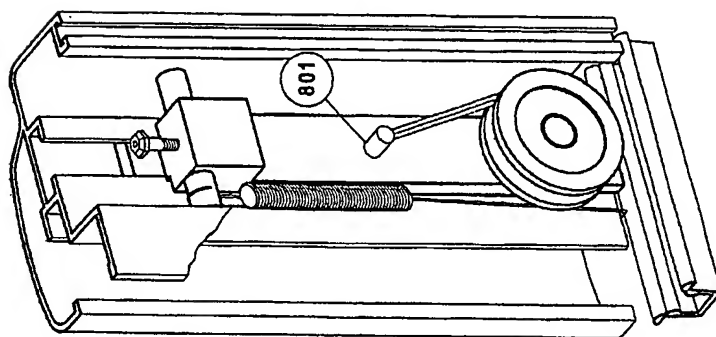
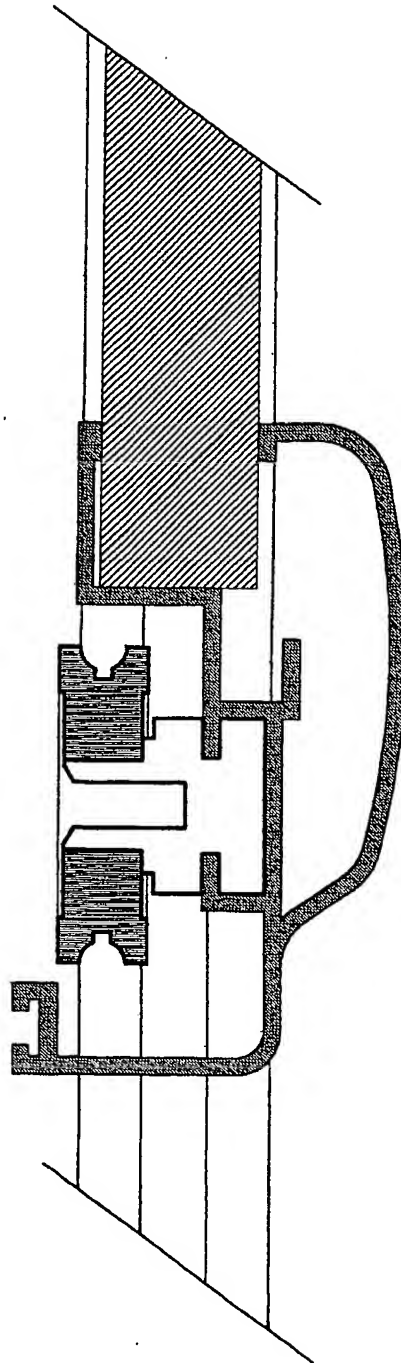


FIG 4a



FIG 4d

FIG 5



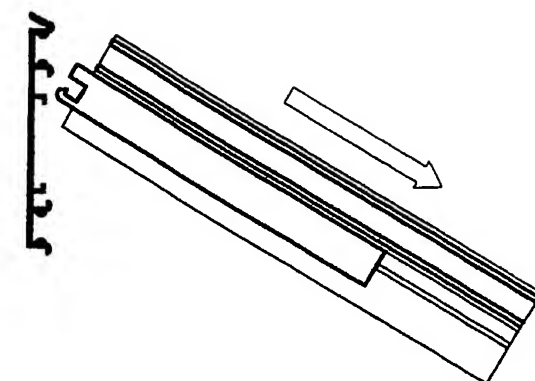


FIG 6c

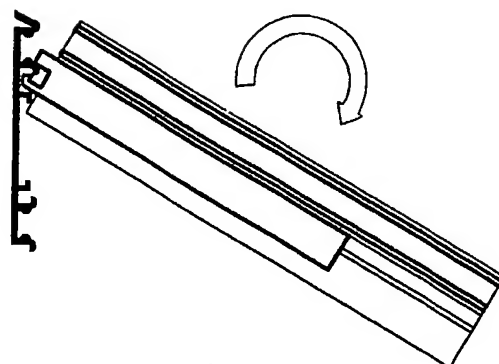


FIG 6b

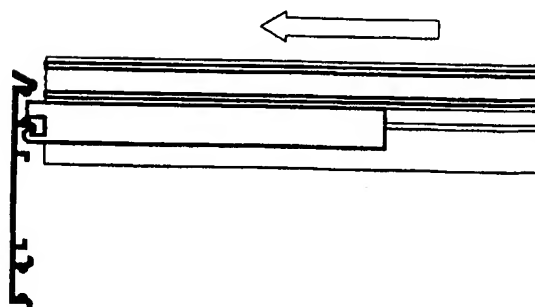
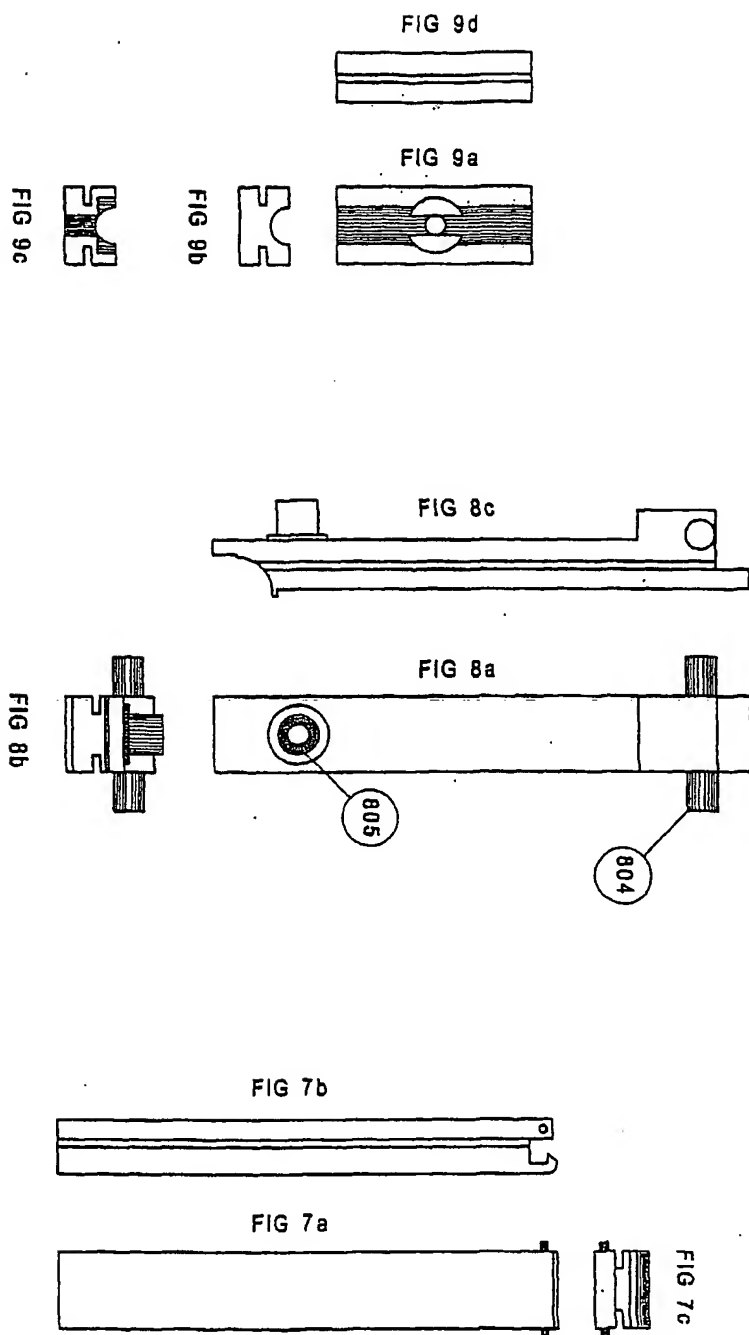


FIG 6a



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LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD,
SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US,
UZ, VC, VN, YU, ZA, ZM, ZW.

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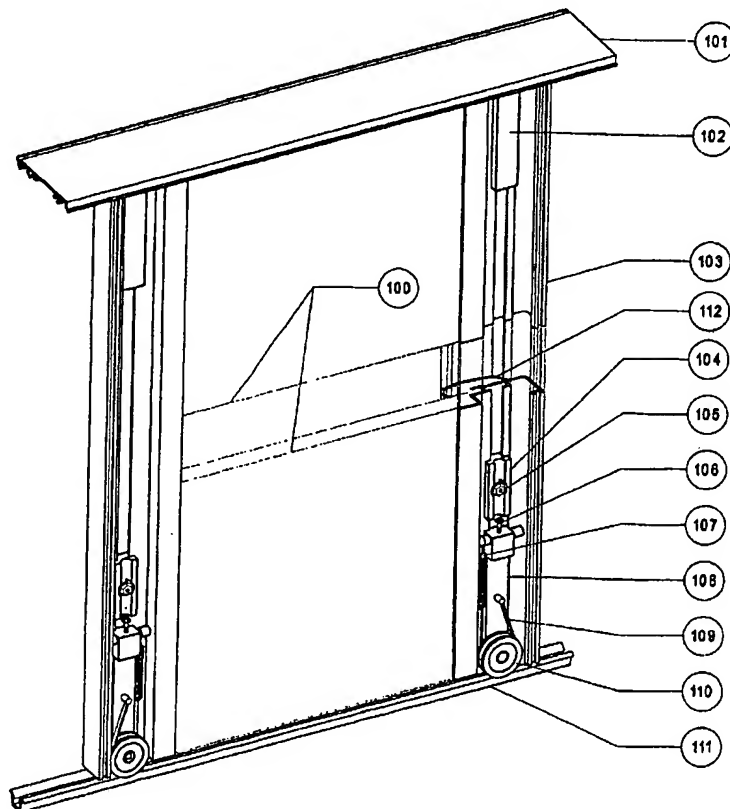
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B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) U.S. : 16/87R,87.2,87.4R,91,94R,95R,96R,105,401; 49/370,424,425,426,427,428,429,434,505; 160/99,105,118 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) USPAT, US-PGPUB, EPO, JPO, DERWENT		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3,281,993 A (RIEGLMAN, H.) 1 NOVEMBER 1966 (01.11.1966), COLUMN 1, LINES 60-72 AND COLUMN 2, LINES 1-17.	1-3,5-7,10-14,16-19,23
Y	US 4,253,278 A (DALLAIRE, R) 3 MARCH 1981 (03.03.1981), COLUMN 1, LINES 45-68 AND COLUMN 2, LINES 1-42.	1-5,7-9,11-16,19-21,23
Y	US 5,119,872-A (ENGBRETSON, D.) 9 JUNE 1992 (09.06.1992), COLUMN 1, LINES 35-57.	1,9-12,17,19,21,23
A	US 3,040,391 A (SAUNDERS, R.) 26 JUNE 1962 (26.06.1962)	1-23
A	US 3,530,618 A (GROSSMAN, A.) 29 SEPTEMBER 1970 (29.09.1970)	1-23
A	US 3,748,784 A (SMITS, D.) 31 JULY 1973 (31.07.1973)	1-23
A	US 3,852,916 A (LABY, J.) 10 DECEMBER 1974 (10.12.1974)	1-23
A	US 4,014,378 A (KOCHANOWSKI, G.) 29 MARCH 1977 (29.03.1977)	1-23
A	US 4,478,006 A (JOHNSON, L.) 23 OCTOBER 1984 (23.10.1984)	1-23
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Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,671,502 A (EZMAN, L.) 30 SEPTEMBER 1997 (30.09.1997)	1-23
A	US 5,349,783 A (JASPERSON ET AL) 27 SEPTEMBER 1994 (27.09.1994)	1-23
A	US 5,845,363 A (BREMPPELL ET AL) 8 DECEMBER 1998 (08.12.1998)	1-23